High resolution vegetation analyses for assessing community assembly in grasslands –a case study from Bulgaria

(Summary)

The aim of the study was, by applying microcoenological survey, to reveal the spatial organization, patterns of dominance and functional diversity of selected communities within the vegetation mosaic in high-mountain pastures, demonstrating the driving role of biotic interactions for vegetation structure. Six study sites were located along an east-west uniform ridgeline of 4.5 km. At each site a pair of adjacent stands of pure grassland N-type and grassland colonized by dwarf shrubs V- type were established (6 sites×2stands). Within each community type 50 × 50 m plot were established, where all species present were recorded. Within these plots, three random plots, sized 4 m × 4 m and five grids sized 0.5×0.5 m and one rectangular 52 m long transect (20 m × 6 m), positioned in the middle of the 50 × 50 m plot were sampled. Projected cover of species in $16m^2$ plots and all species rooted in 0.05m×0.05m microquadrats within the grids and transects were recorded, as measures of species abundance. Values of three plant traits-height (H), specific leaf area (SLA) and seed mass (SM), were collected for all species in the area to assess the functional aspects of vegetation.

Dominants were identified and the spatial associations among them were assessed. Dominants were tested as drivers of diversity, by calculating spatial associations and linear dependences between them and sub-ordinate species richness and diversity. Coarse-scale and fine-scale spatial heterogeneity within each community were revealed by common analytical procedures (ANOSIM, SIMPER) and high resolution structure attributes (Number of realized combinations, NRC and Compositional diversity, CD), respectively. The differences of functional diversity and the mean values of the three selected traits were assessed between the two communities.

The two communities were differentiated by their species composition. Grasslands colonized by dwarf shrubs had higher species and functional diversity and richer species and functional composition, compared to pure grasslands. Six dominants were identified *N. stricta, F. nigrescens, Agrostis capilaris, A. flexuosa* and *Vaccinium* sp.pl. Strong negative spatial association was observed between *N. stricta, F. nigrescens* and *A. flexuosa* and positive spatial association between *A. flexuosa* and *Vaccinium* sp.pl. Significant spatial associations were found between three of the dominant grasses – *N. stricta, F. nigrescens, A. capillaris* and the species richness of sub-ordinate species. From those *F. nigrescens* demonstrated most considerable competitive exclusion on subordinate species in the N-type. No dominants as driver of diversity were distinguished in the V-type. The grasslands colonized by dwarf shrubs demonstrated low coarse-scale and high fine-scale beta-diversity (spatial heterogeneity). The opposite trend was observed in the pure grassland.

The high resolution approach was applied for the first time in Bulgaria. For the first time a thorough and elaborate investigation was conducted of the regularities in the vegetation assembly, defined by biotic drivers. The functional diversity and composition were assessed and used as instruments for detecting trends in the strategies and adaptations of vegetation types in response to changes in grazing pressure. This component of biodiversity was studied for the first time in Bulgaria. A contribution to the knowledge about the effect of sampling approach on the species richness and diversity assessment prior to the field data collection was made.